

Docket No. 3140-0075  
Client No. MERL-1255  
File No. 1159.42683X00



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of

Baback Moghaddam

Application No: 09/444,689

Filed: November 22, 1999

For: GENDER CLASSIFICATION WITH SUPPORT VECTOR MACHINES

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REPLY BRIEF

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

October 27, 2003

Sir:

This Reply Brief is submitted in response to the Examiner's Answer issued August 26, 2003 to the Appeal Brief filed on July 28, 2003, and in further support of the Notice of Appeal filed on May 28, 2003.

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**REMARKS**

It is understood that the obviousness rejection over Osuna in view of Gutta, is applicable only to claims 1, 4-8 and 10-12 (not claims 2-3), as corrected in Section 6 of the Examiner's Answer.

As understood, the grounds for rejection set forth in Section 10 of the Examiner's Answer, are substantially identical to the grounds set forth in the final Official Action.

In the response to arguments set forth in Section 11 of the Examiner's Answer, only a subset of the arguments presented in the Appeal Brief are addressed. Furthermore, as noted in the penultimate paragraph on page 11 of the Examiner's Answer, "[A]dditional evidence and rationale in support of this case is found herein".

**DETENTION U.S. CLASSIFICATION**

The Examiner contends that Osuna, et al. ("Training Support Vector Machines: An application to face detection"), in view of Gutta, et al. ("Gender Classification of Human Faces using Hybrid Classifier Systems" and Moghaddam (U.S. Patent No. 5,710,833) makes obvious the invention recited in the claims of the present application.

In summary, Osuna and Moghaddam are directed to the detection of objects. That is, these references deal with the identification of similar characteristics in the objects of interest. A typical detection problem is the detection of human faces in images by identifying the characteristics in human faces that are similar for all human beings.

Gutta, on the other hand, is directed to object classification. That is, Gutta is directed to identifying slight differences in the characteristics of similar objects. A typical classification problem is classifying the gender of a human face by identifying slight

differences in the characteristics of male and female human faces.

Accordingly, the problem sought to be solved by Osuna and Moghaddam is entirely different than the problem sought to be solved by Gutta. The former seek to identify similarities whereas the latter seeks to identify differences.

What is clearly made obvious by the combination of references, is to use Osuna and/or Moghaddam, to detect a human face in an image, and to then use Gutta to classify the detected human face as either male or female.

### **IMAGE RESOLUTION AND SCALP HAIR**

Osuna teaches a technique that allows the general similarities in all human faces to be identified using low resolution images. Moghaddam discloses that certain characteristics (i.e., scalp hair) which typically differ in male and female faces can be eliminated (masked) in the detection process (males and females typically have different hair styles). Gutta, on the other hand, teaches the use of relatively high resolution images, to identify the slight differences in similar images (i.e., male and female faces), for purposes of classification.

Accordingly, what is made obvious by that which is disclosed in the applied prior art, is to use low resolution images, with the scalp hair cropped, for detection, and to use high resolution images, including scalp hair, for classification.

### **THE PRESENT INVENTION**

The present invention disclosure, in contrast, teaches the classification of gender of a human face using a vector support machine with low resolution images, and with the

scalp hair.

It is respectfully submitted that what is made obvious by the applied prior art, is substantially different than the present invention.

While Osuna does teach the utilization of a vector support machine to identify similarities in all human faces (i.e., characteristics which exist in both male and female faces), there is nothing in the prior art to suggest that a vector support machine could be utilized to determine slight differences between male and female faces. Indeed, the prior art lacks any suggestion as to how one could apply a vector support machine, to identify such differences. Nor is there anything in the applied prior art to suggest (contrary to Gutta's teaching that high resolution images are required for identifying slight differences in the characteristics of male and female faces in order to gender classify such faces) low resolution images can be utilized for gender classification.

As will be understood, the present invention and Gutta, are directed to solving the same problem, but disclose solutions which are entirely different.

Gutta proposes to classify male and female images utilizing a technique which requires a hybrid classifier to identify slight differences in the generally similar characteristics of male and female faces. Gutta's hybrid classifier utilizes what Gutta characterizes generally as a radial basis function (RBF) and a decision tree. The present invention performs the classification utilizing a vector support machine.

While Osuna generally characterizes its vector support machine as a new technique for training a radial basis function classifier, Osuna does not provide any insight whatsoever as to how the disclosed vector support machine could be utilized to train an RBF, such as that disclosed by Gutta. Also lacking, is any suggestion that the disclosed

support vector support machine could somehow be substituted for the RBF and classification tree disclosed by Gutta, or indeed that there would be any likelihood of success in solving the problem to which Gutta is directed , by making such a substitution.

Indeed, it is entirely unclearly how one would go about modifying Gutta to incorporate Osuna's vector support machine to identify slight differences in objects which share similar characteristics and have patterns which are not spacially well defined. Any attempt to substitute Osuna's vector support machine for Gutta's RBF would necessarily require substantial experimentation. Furthermore, even if such a substitution could be made, the results would be entirely speculative, and accordingly, there could be no expectation of success.

The removal of scalp hair in images being utilized for classification, is also entirely unconventional, and there is nothing within the applied prior art to suggest otherwise. Here again, the results of masking scalp hair in images being utilized for classification, rather than detection, would be entirely speculative in view of the teachings of the applied prior art, and accordingly, the results of such masking would have been entirely unpredictable at the time of the present invention.

Although the Examiner contends that the recited use of low resolution images has not been disclosed to provide any previously unanticipated result, one need only look at the results disclosed by Gutta (in applying its classification technique to high resolution images) and the disclosed results obtained with the present technique (utilizing low resolution images) to see that those skilled in the art would consider these later results entirely unexpected, and unanticipated. Thus, the reduction in the resolution of the image to less than 260 pixels clearly leads to unanticipated results as evidenced by Gutta.

The following details those arguments presented in the Appeal Brief, which have not been specifically addressed by the Examiner.

On page 7 of the Appeal Brief, it is noted that in the paragraph of Osuna bridging pages 133 and 134, it is explicitly disclosed that for purposes of Osuna, object classes are those which share similar characteristics, and have spatially well defined patterns. Yet, the Examiner does not explain how, in view of this explicit teaching, it can be asserted that "since Osuna discloses that SVM's generalize well for other object recognition problems, and since SVM's are compatible with RBF classifiers (which are employed by Gutta in gender classification), one skilled in the art would have found it obvious that Osuna's system is operable to classify faces by gender, as claimed".

Nor has the Examiner addressed the issue, raised on page 8 of the Appeal Brief, as to how Osuna's objective of utilizing low resolution images, can be met by the proposed modification in view of Gutta, when Gutta discloses that high resolution images must be utilized for classification.

Still further, the Examiner provides no rationale as to why, in view of the lack of any suggestion in the applied art to mask scalp hair in images being utilized for classification, it would be obvious to do so in view of Moghaddam's disclosure that it is conventional to mask scalp hair for purposes of face detection. Stated another way, one can only ask why it would be obvious to remove a characteristic (scalp hair) from an imaged face, when this characteristic is conventionally considered useful in distinguishing between male and female faces.

In view of the above, it is again respectfully submitted that the only logical basis for the asserted rejections is an improper hindsight reconstruction of the invention based on

the present application's own disclosure, or pure speculation.

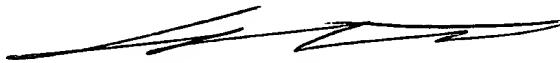
As recently reiterated by the Board, in *Ex parte Hillyer* (68 USPQ 2d 1222), it is not obvious to try unless the applied prior art provides a suggestion to do so. It is respectfully submitted that there is no suggestion, and none has been identified by the Examiner, to even try to make the modifications to the prior art as proposed by the Examiner.

In conclusion, it is again respectfully submitted that no *prima facie* case for the rejection has been established, and that there is no motivation for the proposed combinations and modifications to the prior art. Furthermore, explicitly recited features of the invention are necessarily lacking in the applied prior art. Thus, it is respectfully submitted that the rejections of the claims are improper, and should be reversed.

To the extent necessary, Applicant petitions for an extension of time under 37 CFR § 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Deposit Account No. 01-2135 (Case No. 1159.42683X00) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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